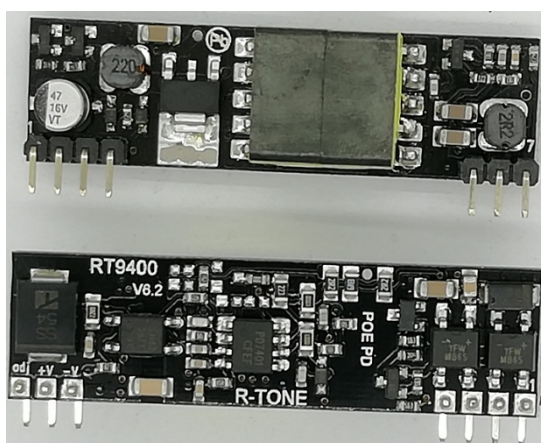


## RT9400

### 13W POE PD Module ( Isolation Model)

#### Product Description



| Version | Date       | Author      | Approved By | Remarks |
|---------|------------|-------------|-------------|---------|
| V1.0    | 2013/10/14 | LI xiao yan | Rock        |         |
| V4.3    | 2014/12/01 | LI xiao yan | Rock        |         |
| V4.4    | 2015/04/22 | LI xiao yan | Rock        |         |
| V6.2    | 2016/05/04 | LI xiao yan | Rock        |         |

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## Features:

- IEEE802.3af compliant
- Input voltage range 36V to 57V
- Integral high efficiency DC/DC converter.
- Low output ripple and noise
- High performance with low price
- Short-circuit protection
- Adjustable Output
- Optional multi-voltage output 3.3V 5V 12V 24V
- Transformer isolation ,1500V isolation (input to output)
- Easy to use, with a minimum number of external components.
- Rohs compliant



## Applications:

- IP Cameras
- Wireless access point
- Security and alarm systems
- VOIP telephone
- Point of sale network terminal equipment

## Description:

The RT9400 series of modules are designed to extract power from a conventional twisted pair Category 5 Ethernet cable, conforming to the IEEE 802.3af Power-over-Ethernet(PoE) standard.

The RT9400 signature and control circuit provides the PoE compatibility signature and power classification required by the Power Sourcing Equipment (PSE) before applying up to 15W power to the port. The RT9400 provides a Class 0 signature.

The DC/DC converter operates over a wide input voltage range and provides a regulated output. The DC/DC converter also has built-in short-circuit output protection.

## I RT9400 Product Selector

| Part Number                 | Nominal Output Voltage | Nominal Output current | Maximum Output Power* | Marking | Package |
|-----------------------------|------------------------|------------------------|-----------------------|---------|---------|
| RT9400-3.3V<br>RT9400S-3.3V | 3.3V                   | 2A                     | 8W**                  | 3.3V    | SIL     |
| RT9400 -5V<br>RT9400S -5V   | 5V                     | 2A                     | 13W**                 | 5V      | SIL     |
| RT9400 -12V<br>RT9400S -12V | 12V                    | 1A                     | 13W**                 | 12V     | SIL     |
| RT9400 -24V<br>RT9400S -24V | 24V                    | 0.5A                   | 13W**                 | 24V     | SIL     |

\*At 25°C with VIN = 48V

\*\* Maximum Output Power: means it not could be operated in continuous stage .only short-term of Boot up/Heavy loading

## I Absolute Maximum Ratings

|   | Parameter                       | Symbol | Min  | Max | Units |
|---|---------------------------------|--------|------|-----|-------|
| 1 | DC Supply Voltage               | VCC    | -0.3 | 60  | V     |
| 2 | DC Supply Voltage Surge for 1ms | VSURGE | -0.6 | 80  | V     |
| 3 | Storage Temperature             | TS     | -40  | 100 | °C    |

Note 1: Exceeding the above ratings may cause permanent damage to the product. Functional operation under these conditions is not implied. Maximum ratings assume free airflow.

## I Recommended Operating Conditions

|   | Parameter              | Symbol | Min | Typ | Max | Units   |
|---|------------------------|--------|-----|-----|-----|---------|
| 1 | Input Supply Voltage1  | VIN    | 36  | 48  | 57  | V       |
| 2 | Under Voltage Lockout  | VLOCK  | 30  |     | 36  | V       |
| 3 | Operating Temperature2 | TOP    | -20 | 25  | 70  | Ta / °C |
|   |                        |        |     |     |     |         |

Note 1: With minimum load

2: See Section Operating Temperature Range

\*\* Extended use close to, or at the maximum operating temperature can reduce the life time of the device.

## I Pin Description:

| Pin # | Name | Description                                                                                                                                                                                                                                                                                                        |
|-------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | VA1  | RX Input (1). This input pin is used in conjunction with VA2 and connects to the centre tap of the transformer connected to pins 1&2 of the RJ45 connector (RX) - it is not polarity sensitive.<br>RT9400S this pin is direct Input +. This pin connects to the positive (+) output of the input bridge rectifier. |
| 2     | VA2  | TX Input (2). This input pin is used in conjunction with VA1 and connects to the centre tap of the transformer connected to pins 3&6 of the RJ45 connector (TX) - it is not polarity sensitive.<br>RT9400S this pin is direct Input -. This pin connects to the negative (-) output of the input bridge rectifier. |
| 3     | VB1  | Direct Input (1). This input pin is used in conjunction with VB2 and connects to pin 4 & 5 of the RJ45 connector - it is not polarity sensitive.<br>RT9400S this pin is direct Input +. This pin connects to the positive (+) output of the input bridge rectifier.                                                |
| 4     | VB2  | Direct Input (2). This input pin is used in conjunction with VB1 and connects to pin 7 & 8 of the RJ45 connector - it is not polarity sensitive.<br>RT9400S this pin is direct Input -. This pin connects to the negative (-) output of the input bridge rectifier                                                 |
| 5     | -VDC | DC Return. This pin is the return path for the +VDC output.                                                                                                                                                                                                                                                        |
| 6     | +VDC | DC Output. This pin provides the regulated output from the DC/DC converter.                                                                                                                                                                                                                                        |
| 7     | ADJ  | Output Adjust. The output voltage can be adjusted from its nominal value, by connecting an external resistor from this pin to either the +VDC pin or the -VDC pin.                                                                                                                                                 |

## I DC Electrical Characteristics

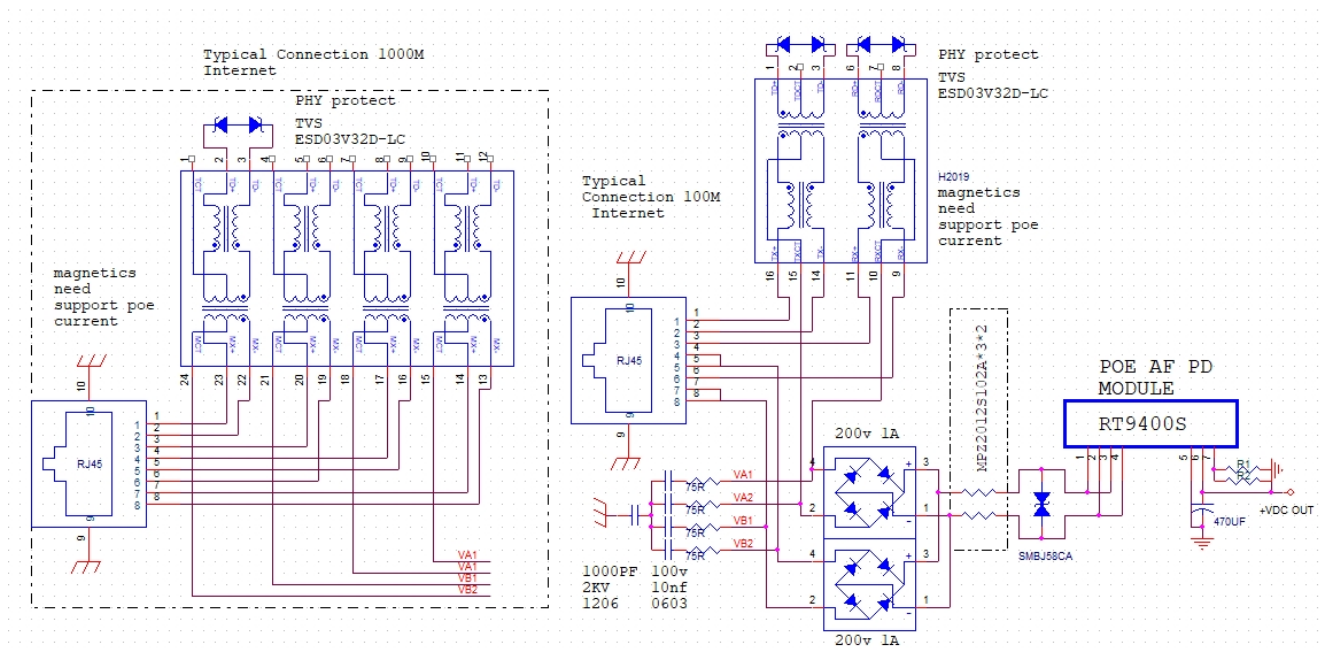
|    | DC Characteristic                 | Sym   | Min                         | Typ1                       | Max                         | Units                | Test Comments                                        |
|----|-----------------------------------|-------|-----------------------------|----------------------------|-----------------------------|----------------------|------------------------------------------------------|
| 1  | Nominal Output Voltage            | +VDC  | 3.1<br>4.75<br>11.5<br>23.5 | 3.3<br>5.0<br>12.0<br>24.0 | 3.5<br>5.25<br>12.5<br>24.5 | V<br>V<br>V<br>V     | RT9400-3.3V<br>RT9400-5V<br>RT9400-12V<br>RT9400-24V |
| 2  | Output Current ( $V_{IN} = 48V$ ) | PWR   |                             |                            | 2<br>2<br>1.0<br>0.5        | A<br>A<br>A<br>A     | RT9400-3.3V<br>RT9400-5V<br>RT9400-12V<br>RT9400-24V |
| 3  | Line Regulation                   | VLINE |                             | 0.1                        |                             | %                    | @ 50% Load                                           |
| 4  | Load Regulation                   | VLOAD |                             | 1                          |                             | %                    | @ $V_{IN}=48V$                                       |
| 5  | Output Ripple and Noise           | VRN   |                             | 100                        |                             | mVp-p                | @ Max load2                                          |
| 6  | Minimum Load                      | RLOAD | 200<br>200<br>100<br>50     |                            |                             | mA<br>mA<br>mA<br>MA | RT9400-3.3V<br>RT9400-5V<br>RT9400-12V<br>RT9400-24V |
| 7  | Short-Circuit Duration3           | TSC   |                             |                            | $\infty$                    | sec                  |                                                      |
| 8  | Efficiency @ 80% Load             | EFF   |                             | 79<br>84<br>87<br>87       |                             | %<br>%<br>%<br>%     | RT9400-3.3V<br>RT9400-5V<br>RT9400-12V<br>RT9400-24V |
| 9  | Isolation Voltage (I/O)           | VISO  |                             | 1500                       |                             | V <sub>PK</sub>      | Impulse Test                                         |
| 10 | Temperature Coefficient           | TC    |                             | 0.02                       |                             | %                    | Per °C                                               |

Note 1: Typical figures are at 25°C with a nominal 48V supply and are for design aid only. Not Guaranteed

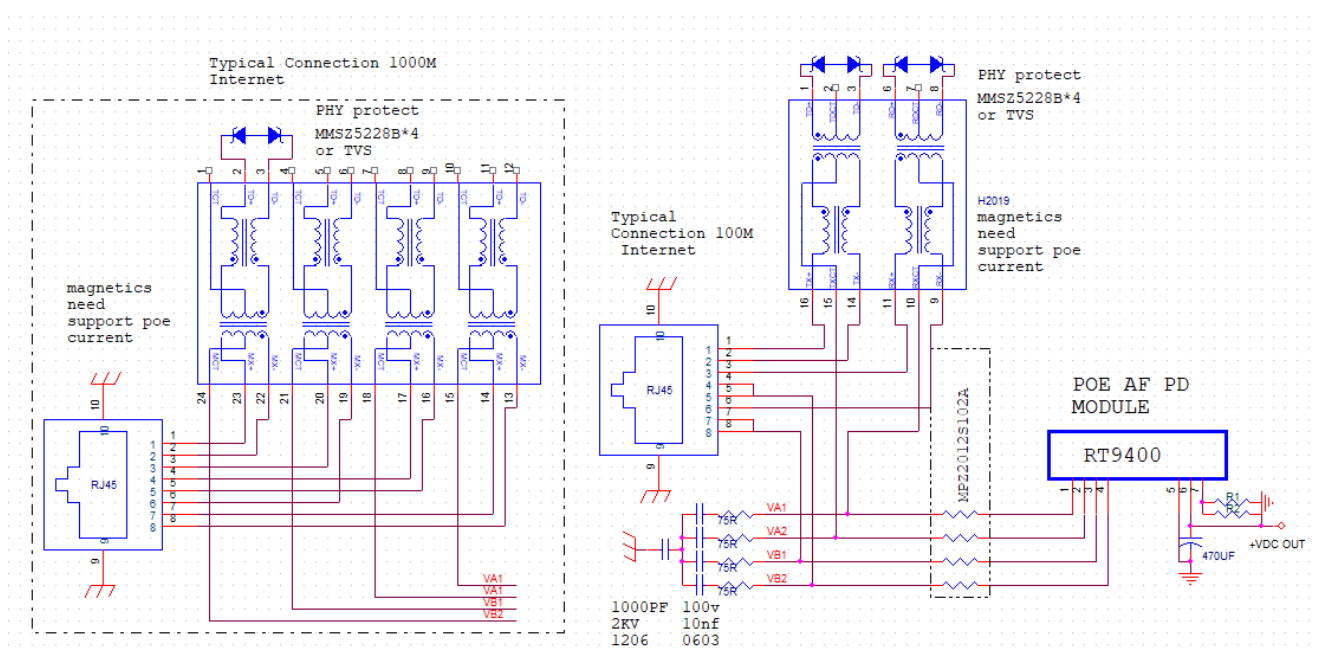
2: The output ripple and noise can be reduced with an external filter, see application note.

3: Continuous short circuit duration is applicable at 25°C ambient temperature in free air. At higher temperatures or with restricted airflow (e.g. in a sealed enclosure) the duration will need to be limited to avoid overheating.

## I RT9400S Typical Connection Diagram:



## I RT9400 Typical Connection Diagram :



| Reducing the output voltage, connect R2 between ADJ and +VDC |          |                |          |                |
|--------------------------------------------------------------|----------|----------------|----------|----------------|
|                                                              | R2 Value | output voltage | R2 Value | output voltage |
| RT9400-3.3V                                                  | open     | 3.3V           | 0R       | 2.8V           |
| RT9400-5V                                                    | open     | 5V             | 0R       | 4.4V           |
| RT9400-12V                                                   | open     | 12V            | 0R       | 9.9V           |
| RT9400-24V                                                   | open     | 24V            | 30K      | 18.2V          |

| Increasing the output voltage, connect R1 between ADJ and -VDC |          |                |          |                |
|----------------------------------------------------------------|----------|----------------|----------|----------------|
|                                                                | R1 Value | output voltage | R1 Value | output voltage |
| RT9400-3.3V                                                    | open     | 3.3V           | 0R       | 3.7V           |
| RT9400-5V                                                      | open     | 5V             | 0R       | 5.7V           |
| RT9400-12V                                                     | open     | 12V            | 0R       | 12.8V          |
| RT9400-24V                                                     | open     | 24V            | 0R       | 25.5V          |

## I Reliability MTBF:

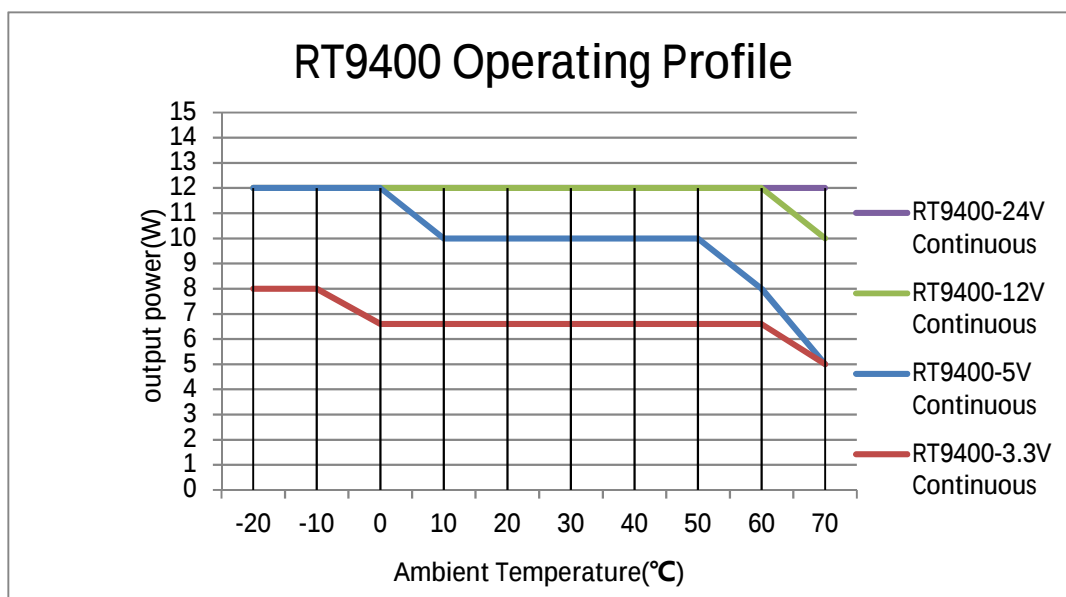
About the life time ,we design according to the following:

- 1) life time of RT9400 : 100,000 hours @ 25°C
- 2) RT9400 use a Aluminum Electrolytic Capacitors (47uf 16v) Life Calculation:2000 hour@105 degree

## I Safety test items & test report

| Test Requested                                                                                          | Test result |
|---------------------------------------------------------------------------------------------------------|-------------|
| Electric strength -1500Vrms at 50 to 60Hz for 60s, applied as specified in subclasse 5.2.2 of IEC 60950 | Pass        |

## I Operating temp profile

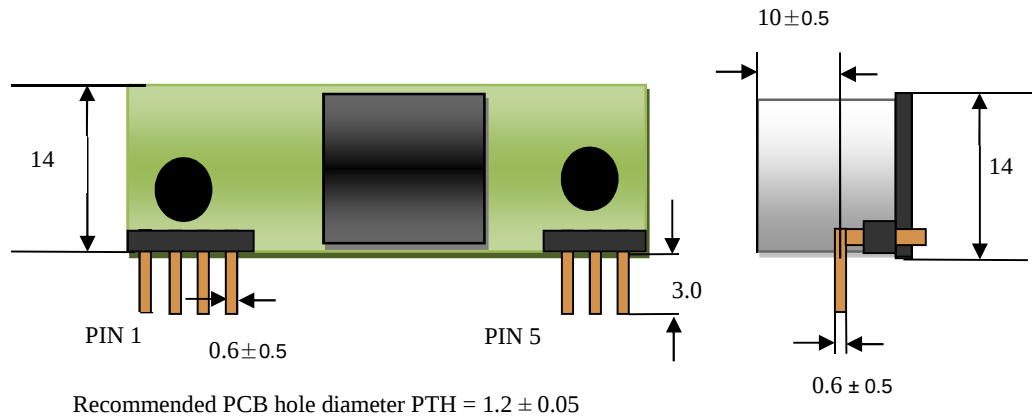


**I Mechanical / Environmental Performance data**

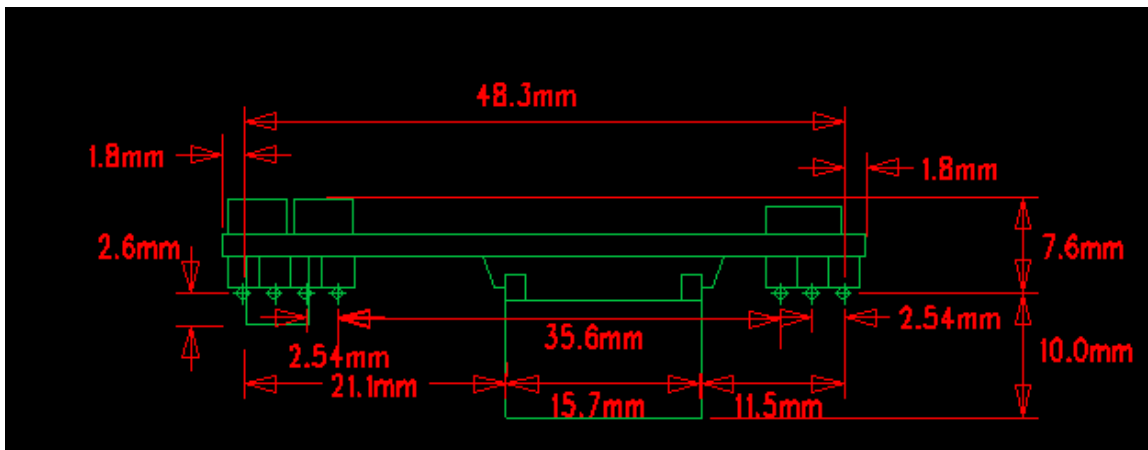
| Mechanical / Environmental Performance data |                                       |                                                                                                                                  |
|---------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
|                                             | Item                                  | Requirement and Standard                                                                                                         |
| 1                                           | Resistance to Wave Soldering Heat     | max Preheat Temp range & time 120 °C / 180S<br>max soldering temp & time: 265 °C / 4S                                            |
| 2                                           | Solder ability                        | Solder able area shall have minimum of 95% solder coverage.<br>And then into solder bath, Temperature at 245 ±5 °C , for 4-5sec. |
| 3                                           | Hand Soldering Temperature Resistance | T > =350 °C , 3sec at least.                                                                                                     |
| 4                                           | Thermal Shock                         | subject to follow condition for 5 cycles. 1 cycles:<br>-55 °C , 30 minutes<br>+85 °C , 30 minutes                                |
| 5                                           | Humidity(Temp Cycling)                | less than 95% (non-condensing) ( -20 to 70 °C)                                                                                   |
| 6                                           | Temperature Life                      | temperature life at 85°C for 96 hours.                                                                                           |
| 7                                           | Salt Spray                            | connectors to 5% salt-solution concentration, 35 °C<br>Gold flash for 8 hours there will be no change in the gold layer          |



### I RT9400 Package Size: (mm )



**I RT9400 PCB Decal : (mm )**



## I Packaging type & Quantity

## EPE or BLASTIC Packaging,

50pcs/ dish

500pcs/box      Box size 30\*35\*20cm      6.7KG/box

## I RT9400 RoHs certification

|                                                                                                                                                                                                                                                    |                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                   | <b>Shenzhen POCE Technology Co., Ltd.</b><br>H Building, Hongfa Science and Technology Park,<br>Tangtou, Shiyan, Bao'an District, Shenzhen, China |
| <b>CERTIFICATE OF CONFORMITY</b>                                                                                                                                                                                                                   |                                                                                                                                                   |
| <b>Certificate No.</b>                                                                                                                                                                                                                             | : POCE15042321PCR                                                                                                                                 |
| <b>Applicant</b>                                                                                                                                                                                                                                   | : ShenZhen RING&TONE Communicate CO., LIMITED                                                                                                     |
| <b>Address</b>                                                                                                                                                                                                                                     | : B2003,2nd Floor, pengshi Industria Building,Fanshen Road NO.326,<br>Baoan 43 District, Shenzhen, China                                          |
| <b>Manufacturer</b>                                                                                                                                                                                                                                | : ShenZhen RING&TONE Communicate CO., LIMITED                                                                                                     |
| <b>Address</b>                                                                                                                                                                                                                                     | : B2003,2nd Floor, pengshi Industria Building,Fanshen Road NO.326,<br>Baoan 43 District, Shenzhen, China                                          |
| <b>Product</b>                                                                                                                                                                                                                                     | : POE Module                                                                                                                                      |
| <b>Trade Name</b>                                                                                                                                                                                                                                  | : RING&TONE                                                                                                                                       |
| <b>Model(s)</b>                                                                                                                                                                                                                                    | : RT9400, RT9400-3.3V, RT9400-5V, RT9400-12V, RT9400-24V                                                                                          |
| <b>Test Report No.</b>                                                                                                                                                                                                                             | : POCE15042321PRR                                                                                                                                 |
| <b>Test Standards</b>                                                                                                                                                                                                                              | : IEC 62321(Ed.1)- 2008-12-11                                                                                                                     |
| <p>The EUT described above has been tested by us with the listed standards and found in compliance with the council <b>ROHS Directive 2011/65/EU</b>. It is possible to use CE marking to demonstrate the compliance with this ROHS Directive.</p> |                                                                                                                                                   |
|                                                                                                                                                                 | <br>For Chief Executive Jerry Yang<br>Date: Apr. 28, 2015     |
| <p>This certificate of conformity is based on a single evaluation of the submitted sample(s) of the above mentioned product. It does not imply an assessment of the whole production and other relevant directives have to be observed.</p>        |                                                                                                                                                   |
| Web: <a href="http://www.poce-cert.com">http://www.poce-cert.com</a> Tel: +86-755-29113252 Fax: +86-755-29113135                                                                                                                                   |                                                                                                                                                   |